

Hydrogen Fuel Flexibility for Distributed Power Generation with Gas Engines

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Abstract

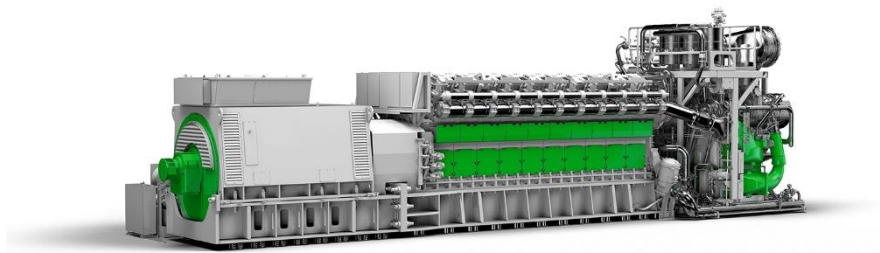
Gas engines are providing a wide range of fuel flexibility from burning natural gas and a variety of non-natural gaseous fuels from low BTU gases as well as gases containing a high hydrogen content. Hydrogen containing gases can be found as by-product from steel or chemical process, or alternatively hydrogen is produced and blended to natural gas. Power to Gas is a new source of hydrogen and therefore hydrogen could become an increasing component in the gas fuel supply network.

In the mid-sized power generation segment from 0.5 to 200 MW, INNIO's Jenbacher gas engines are a proven technology provider for fast response and peaking power as well as combined heat and power (CHP) plants. The trend to decentralized power generation with power and heat generation at the point of use allows gas engine installation to achieve a high fuel utilization rate above 90 %. The wide fuel flexibility, especially with non-natural and renewable gases such as biogas, biomethane and blended hydrogen all the way to high hydrogen content in the fuel makes gas engines a future technology in the energy transition.

Coke oven gases as well as gases as byproduct from chemical processes containing a hydrogen content up to 70 volumes % have been used in various types of Jenbacher gas engines and accumulated well more than one million operating hours. Gas from renewable sources like wood gasification can contain up to 50 volume % of hydrogen. One of the main purposes to produce green hydrogen is to add it to the natural gas system, because the natural gas system is seen as a seasonal and large energy storage and necessary for balancing the

intermittent electricity production from renewables wind and solar. When hydrogen is mixed with natural gas, the hydrogen content can vary in a wide range. Gas engines have the capability to burn gases with a wide range of hydrogen content, but there are also some challenges with a potentially high fluctuation of the hydrogen content or fast rate of change.

The advantages of hydrogen and greener gas is discussed in this paper. Historical and current experience with high hydrogen fuels burning in gas engines is demonstrated on various projects installed around the globe. The R&D project HyMethShip is demonstrating a future scenario of decarbonizing the marine industry with emission free ship propulsion.



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